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WHAT LIES BEHIND THE UNPRECEDENTED INCREASE IN INCOME INEQUALITY IN FINLAND DURING THE 1990'S

Abstract

This study uses a decomposition analysis of income inequality by income groups and income sources to understand and explain the inequality increase in Finland during the 1990's. Several conclusions can be drawn from our results. Total inequality rose significantly during the latter part of the 1990's. The results suggest that capital income is the most significant contributor to overall inequality in Finland. As a general pattern inequality rose proportionately more within those socio-economic groups with growing capital income share. The 1993 tax reform, a so-called dual income tax system, is undoubtedly one of key factors responsible for this trend. Rising unemployment in the early 1990's, perhaps surprisingly, did not just increase income inequality. More importantly, the numbers of the unemployed below the poverty line (50 per cent of national average income) have risen from 1994. One of the most striking findings of our study is that since 1991 there has been a declining trend in the average real disposable income of unemployed households. The paper also shows that the redistributive impact of taxes and transfers has declined during the 1990's.

Key words: Inequality, unemployment, income decomposition

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1 Introduction

For a long time in the post war period in many industrialized countries income differences were gradually declining. This was just as Kuznets (1955) hypothesized that, following an initial widening of the income distribution, income differences in advanced countries would move towards greater equality. The recent experience from the beginning of the 1980's shows that the process described by Kuznets has gone into sharp reverse in many advanced countries. Nevertheless income inequality did not increase in all countries in the 1980's, among others in Finland. Moreover, according to Atkinson et al. (1995) income inequality in Finland was lowest in OECD countries in the 1980's. Figure 1 shows what has happened to the Gini coefficient (of different income concepts) in Finland between 1966 and 1998. Three periods can be distinguished in the case of disposable income.[1] The first period, between 1966 and 1976, saw a very remarkable fall in inequality. The inequality remained almost constant until the turning point in the beginning of the 1990's. Since then, from the beginning of the 1990s, there is little doubt that income inequality has become unequal. In the first five years (1990-1994) considered in Figure 1 inequality rose only modestly, coinciding with a period of rapidly increasing unemployment. During the following period as the Finnish economy recovered, inequality rose very quickly. Average real incomes have grown significantly since 1994, but at the bottom of the scale there has been little or no rise in real income, whereas top incomes have risen a great faster than the average. This rise of income inequality is departure from the pattern of previous decades in Finland. Figure 1 also shows how the indicators of redistribution have varied in Finland over the period since 1966. The Gini coefficient for factor income declined from around 38 percent in 1966 to 35 percent in 1976, since then it increased slightly up to the beginning of the 1990's. Then it rose rapidly due to unemployment, but from 1993 the Gini coefficient for factor income has risen much less than the Gini coefficient for disposable income. The Gini coefficient for gross income (including transfers) has very much the same pattern as for disposable income. The redistributive impact of transfers and taxes appears to have fallen since 1994. So we know what happened during the 1990's but the question to be asked is why?[2]

[1] Like most inequality measures, the Gini coefficient measures inequality relative to two limits. It takes a minimum value of zero if income is equally distributed across the population, with all individual receives the same income. It takes a maximum value of one in a situation where all income would be given to a single individual in the society.

[2] For further discussion of Finnish income distribution sources, see Riihelä – Sullström – Tuomala (2001) and Suoniemi (2000).

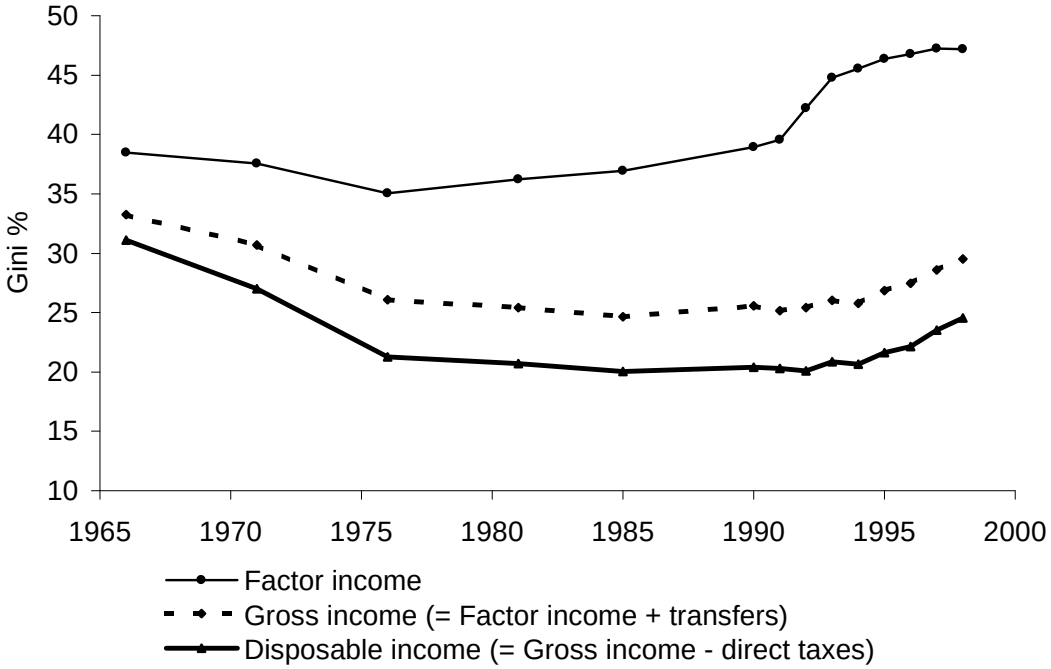


Figure 1 Gini coefficients of incomes in Finland 1966-1998

What can explain this rise in inequality? Why has the previous trend been reversed? There are strong grounds for believing that the rise in income inequality in Finland in the 1990's was associated with a fall in the proportion of households with income from work. According to the Income Distribution Statistics, the largest source of household income comes from work, earnings (= labour income plus entrepreneurial income) over the period considered. Between 1966 and 1998 there was a declining trend in the importance of work. Most importantly between 1990 and 1994 there was a significant reduction in the proportion of household income from work, resulting mostly from unemployment. However, the rise in unemployment turns out to be only a small part of the story. The important part of explanation for the inequality increase must be sought in the divergence of experiences with particular groups and especially in the role of capital income. Although the biggest income component is still earnings, 85.8 per cent of disposable income in 1998, the share of capital income has risen from 6.6 per cent in 1990 to 15.1 per cent in 1998. Instead, rising unemployment appears to have had an important poverty-increasing effect.

In this paper we are concerned in particular with the economic circumstances

of people who do not work versus those that do. If we look at the distribution of earnings, we observe great inequality. There is considerable inequality not only amongst those who belong to the labour force, but there are large number of people without any labour income. People without labour income may still have a reasonable standard of living. The reason is not only that we have welfare state programs but the consumption is not only determined by current income, but also by past and future income. The distribution of lifetime income would almost by definition show less inequality than that of annual income. These are important considerations in assessing consequences of the deep recession we experienced in Finland in the 1990s.[3]

It is clear that if we are concerned with inequality, what really matters is not the distribution of income per se, but the distribution of the standard of living between individuals and households. At a more general level we can raise an important question what is precisely the difference between income inequality and economic inequality. As has been argued most notably by Amartya Sen (1997) the distinction is of considerable importance for economic practice as well as economic theory. "Income is, of course, a crucially important means, but its importance lies in the fact that it helps the person to do things that she values doing and to achieve states of being that she has reasons to desire". There may be substantial differences between the income-based view and non-income indicators of quality of life. In particular inequality comparisons will yield very different results depending on whether we concentrate only on incomes or also on the impact of other economic and social influences on the quality of life. For example, it may be so that an over-concentration on income inequality alone has permitted greater social and political tolerance of unemployment in Finland or other European countries that cannot be justified if we have a broader view of economic inequality.

Standard of living is not an easy concept to make empirically operational. It clearly depends on the level of consumption of private goods, on the supply of public goods and publicly provided private goods such as education, health care and social services. There is no single, correct way of measuring the standard of living. Therefore both income and expenditure inequality need to be considered in forming a comprehensive view of inequality. The majority of empirical studies concentrate on income as the primary measure. In most cases this reflects the availability and reliability of data. Nevertheless, there are a number of important insights that can be gained by looking at expenditure as well. In this paper we focus

[3]See Riihelä – Sullström (2000) on this aspects.

on income inequality.[4]

We employ a decomposition analysis of inequality by income source and by population groups to understand and explain particular aspects of economic inequality in Finland. Making use of decomposition allows answers to questions as: How much is contributed to inequality by different population groups? And how much is contributed by different income sources? There are numerous ways of decomposing the population to reveal its constituent parts and their contribution to the overall picture of economic inequality. The choice of categories for decomposition will be determined by the object of the analysis. Because one of our aims is to explain how the shift from work has affected economic inequality turned out to be very useful to consider two categories, those in work and those not in work.

The structure of the paper is as follows. Section 2 describes the data used in our study. Section 3 provides an analytical framework for decomposing inequality by income groups. We focus on two groups, those households where either husband or wife is in work and those where neither in work. Section 4 in turn applies this framework to study the impacts of the shift from work on inequality. It also examines changes in the tax and benefit system and the effects that these have had on inequality. The following section breaks income down into its constituent parts. It considers from where households receive money and how the importance of different sources has altered during the 1990's. Section 6 concludes the paper.

2 The Data

We describe briefly the data used in this study. We use the income distribution statistics (IDS) published by the Statistics Finland. The IDS is a sample survey of around 9000-11000 households drawn from the private households in Finland. The IDS contains information on incomes, taxes and benefits in conjunction with various socio-economic characteristics of the Finnish households. Most of the information contained in the IDS has also been collected from various administrative registers. Auxiliary information is collected through interviews. The following concepts of income are used in this study.

1. Earned income, including

    1.1 Labour income

    1.2 Entrepreneurial income

[4] Riihelä – Sullström (2000) in turn focuses on expenditure inequality.

2. Capital income
3. Factor income (1+2): Total household money income before direct taxes and current transfer received.
4. Current transfers received, including
   - 4.1 National pensions
   - 4.2 Earnings-related pensions
   - 4.3 Unemployment benefits
   - 4.4 Other current transfers received
5. Gross income or pre-tax income (3+4): Total household money income before direct taxes and social security contributions that households pay.
6. Current transfers paid, including
   - 6.1 Direct taxes
   - 6.2 Other current transfers paid
7. Disposable income (5+6): Total household income after taxes and social security contributions. Sometimes we call disposable income as a net income because it is market income (i.e. factor income) plus net transfers (i.e. difference between received transfers and paid transfers of household).

Other taxes, such as VAT and specific commodity taxes, are not included on our data. This may have important consequences, because the progressivity of the Finnish tax system results from labour income taxation.

All the types of income used in this study are calculated on an annual basis. The OECD equivalence scale are used in order to make comparable households with different composition. The OECD-scale is calculated as follows. The first adult in each household has a weight of 1 and each additional adult a weight of 0.7. The children (under 18 years old) get a weight of 0.5.

3 Decomposing Inequality by Income Groups: an analytical framework

Before going to empirical analysis we show how the analytical framework of decomposition method may be used to throw light on which is the impact of higher unemployment on the distribution of income.[5] Let us briefly describe this method

[5]See Kanbur (1982) on the pioneering work in using the analytical framework of inequality decomposition.

in this context. We consider two populations consisting of the working population and the unemployed. Let us denote by x the share of the population who belong to the working population. We index them by 1 and unemployed in turn by 2. Overall inequality can be written as function of the group means, the group inequalities, and the population shares:

$$I = I(m_1, m_2, I_1, I_2, x) \tag{1}$$

Or put it another way overall inequality in the society can be seen as made up of between-group inequality and within-group inequality.

How exactly are the between-group and within-group components of inequality to be constructed? There are in literature two specifications of decomposability. The generalized entropy class (Shorrocks, 1980) has a natural decomposition based on the hypothetical distribution, which assigns to each person within group the mean income of the group. This process eliminates within group inequality. The resulting distribution shows only the inequality arising from between-group differences. Thus within group inequality is the difference between the total and the between-group terms. In our case, the population were partitioned by employment status groups, the between group component would indicate the inequality arising from employment status variations in income, while the within-group component would indicate the portion of inequality attributable to other factors. Anand (1983) notes that there is another, equally plausible, decomposition based on an alternative hypothetical distribution in which the group means are equalized by proportionally scaling each subgroup distribution until it has the same mean as the total distribution. This process suppresses between-group inequality while leaving group inequality levels unaltered. Thus it is reasonable to define an inequality measure to be additively decomposable if for any grouping the overall inequality can be written as the sum of between-group and within-group inequality. Shorrocks (1982) shows that the second Theil measure is decomposable according to both definitions. Anand (1983) in turn notes that the variance of log income is consistent inequality decomposition if the between-group component is the log-variance of the geometric means.

For a sake of exposition we illustrate our two group case here with the variance of log-income. Other measures as squared coefficient of variation, Theil's measures, Atkinson index and Gini coefficients are used in empirical part of this paper.

The overall variance of log-income is given by

$$I_y = xI_1 + (1-x)I_2 + x(1-x)(m_1/m - m_2/m)^2 \tag{2}$$

where y is log-income and m's are corresponding mean log-incomes. Total inequal-

ity is the sum of three terms, the first two terms reflect the inequality within group (within group component) and the third one is the inequality between groups (between groups component).

For the unemployed, their incomes will depend on what capital income they receive and on the transfer payments. Suppose simply they all receive the same income b; unemployment benefit. We further assume that b is smaller than mean income. The overall inequality is then

$$I_y = xI_1 + x(1-x)(m_1/m - b/m)^2 \tag{3}$$

The contribution of the unemployed to inequality arises because they have a level of benefit below the average.

What now happens if the rate of unemployment increases? We may expect the inequality to increase. However, this is not necessarily so simple. Namely a fall in x also reduces the mean level of income

$$m = xm + (1-x)b \tag{4}$$

If inequality is less among the unemployed, then to some extent there will be an equalizing effect of unemployment, since it puts more people in a group with less intrinsic inequality. What about if group 2 is the more unequal group, which seems to be the case in Finland as we see in Section 4. Now in the sense of comparative static an increase in unemployment (a) increases relative number in the group 2 ($I_1 < I_2$), and (b) reduces the mean income of the group 2. Now it may be seen intuitively obvious that increasing the relative share of the more unequal group 2 must itself increase overall inequality. But this is not necessarily a monotonic increasing function of the relative population share of the more unequal group. Moreover, even in the range that the effect (a) increases inequality, the effect (b) may well pull in the opposite direction. To see this, consider the model in which intra-group log-variances I_1 and I_2 and intra-group log-means m_1 and m_2 are assumed to be fixed in order to concentrate purely on the effect a change in relative population share of the more unequal group 2. Differentiating (2) with respect to x we have

$$\partial I_y/\partial x = I_1 - I_2 + (1-2x)(m_1 - m_2)^2 \tag{5}$$

And it is seen that the function I is non-monotonic in the range $x \in [0,1]$ if $[I_1 - I_2]/[m_1 - m_2]^2 < \frac{1}{2}$.

It is also interesting to note (when $I_1 > I_2$) even if the rate of unemployment increases the overall distribution will still become more equal even where $x > \frac{1}{2}$. This is just what seemed to be the case in the early part of recession in the 1990's.

4 Decomposition by income groups; Impact of the shift from work on the distribution of income in the 1990's

Overall, the most important component of income is earned income, earnings (labour income plus entrepreneurial income) which makes up 62.8 per cent of gross income in 1998. Throughout the last four decades, earned income has made up the most important source of gross household income in Finland, but their role has been a declining one. Table A2 in Appendix A, in which gross income is broken down into different components, show how the shares of gross income have altered. The share of earned income has fallen from 85.2 in 1966 (in Household Survey) to 62.8 in 1998 (in IDS) and as a per cent of factor income from 93.9 to 86.0. This reflects the trend towards lower levels of employment and the fall in the number of farmers. The greater part of this fall occurred between 1990 and 1994, during which period the share of earned income fell from 74.7 percent to 60.2 per cent, just as the rate of unemployment reached unprecedented levels (see Figure 2). But the gradual trend downward had occurred throughout the last three decades. The second biggest source of income throughout the period has been transfers or social security. Its share has risen sharply from 9.3 per cent in 1966 to 30.9 per cent in 1994 and then it has fallen to 26.1 in 1998. The share of capital income actually declined from the mid 1960's to the mid 1980's, but since then has gradually risen to form 11.0 per cent of household income in 1998. Figure 2 also shows how dramatically the percentage of households where the head was in work has fallen. This fell by 10.2 percentage points between 1990-1998.

The consequences of this shift in the importance of earned income depend on how it has been shared. Has the fall in earned income spread proportionately across the population, especially during the first part of the 1990's? There is no evidence for this case in Finland in the 1990's. On the contrary the proportion of household where the head was employed or self-employed fell dramatically by 9.8 per cent points between 1990 and 1994 (see Table 1).

Using the similar inequality decomposition technique described in Section 3 and the data from IDS in 1990-1998 we explore how has this decline in the importance of work affected the distribution of income and expenditure during the 1990's in Finland.

There are, of course, a number of different ways of splitting the population for the purposes of decomposition analysis. In the first stage we have chosen to split it

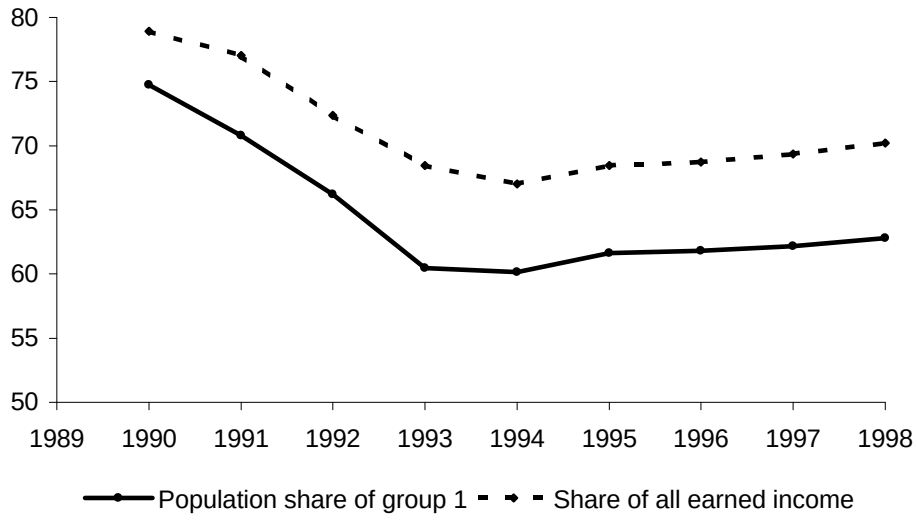


Figure 2 The share of earned income (%) and the proportion of households where household head is in work (%)

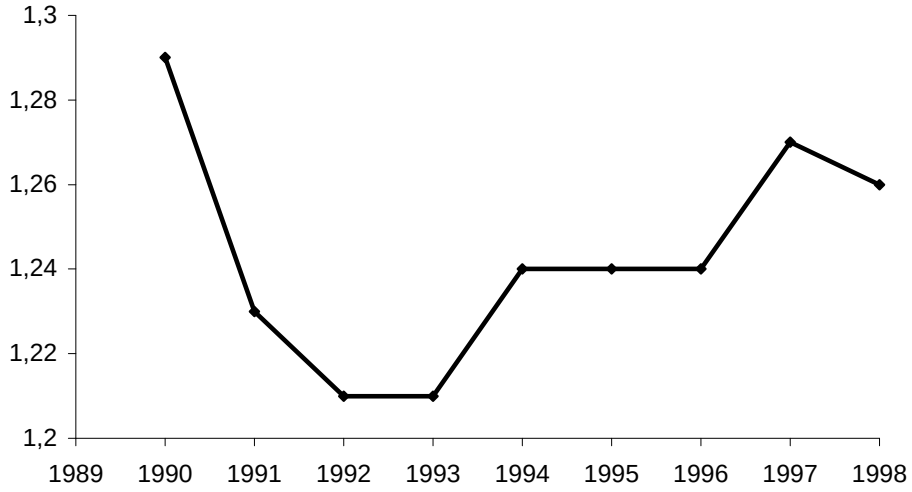


Figure 3 The ratio of mean-disposable income of two groups

into two groups; those households where household head is in work, denoted by 1 and those where household head is not in work denoted by 2 (mainly unemployed and pensioners).

How to interpret the empirical evidence? The shift from work produces simultaneous shifts in both population shares and relative incomes (see Figure 3 and Table 2). The effect of this shift from group 1 to group 2 depends also on the distribution within the two groups. Is income inequality greater among the group 1 than among the group 2? All six measures used (see Appendix B), the generalized

Table 1

The ratio of mean incomes (m_1/m_2) and the population share of group 1

Year	Factor income	Gross income	Disposable income	Population share of group 1
1990	5.91	1.51	1.29	67.1
1991	5.00	1.41	1.23	65.5
1992	4.86	1.38	1.21	60.9
1993	4.67	1.36	1.21	56.9
1994	5.01	1.41	1.24	55.3
1995	5.54	1.42	1.24	56.3
1996	5.79	1.44	1.24	56.6
1997	5.65	1.46	1.27	57.5
1998	5.05	1.45	1.26	58.4

Incomes is adjusted by the OECD equivalence scale

entropy measures (including Theil's measures, the mean log deviation ($c = 0$) and the Theil index ($c = 1$) and the squared coefficient of variation ($c = 2$) (Shorrocks 1980)), the variance of logarithms[6], the Atkinson index ($e = 0.5$, 1 and 2).[7] and the Gini coefficient[8], reflect higher inequality among those not in work (in the group 2). On the basis of IDS data, the inequality in both groups continued to increase throughout the 1990's. Furthermore, the Lorenz curves for those two groups do not cross during the 1990's. The Lorenz curve differences between 1990 and 1998 are plotted in Figure A1 in Appendix A.

In order to make meaningful comparisons between estimates of inequality of

[6]The variance of logarithms used in Section 3, does not belong to the generalized entropy class. The variance of logarithms uses the geometric mean an alternative representative income that places more weight on low incomes.

[7]e is inequality aversion parameter

[8]See Cowell (1995) for a good exposition of these measures

different distributions we need to examine the statistical significance of the results. We employ technique developed by Cowell (1989). Table 2 attaches standard errors to the calculated inequality measures.

The rise in the proportion of households without earned income is important because this group not only has a lower average income but also exhibits much greater inequality than the group 1. It may be some sort of surprise that there is more inequality among the household without earned income. Because earned income makes up the largest single source of household income we might reasonable expect the most important trends in inequality are driven to a large extent by changes in the distribution of earned income. This does not seem to be the case in Finland in the 1990's. This also makes it of particular interest to examine more closely income sources of both groups.

When considering the contribution to total inequality made by different groups, it is possible to split this total figure into two principal components, a between-group component and a within-group component. The values given in the Table 3 for the between group inequality show what the inequality measures would be if all members of each group were given the mean income for that group. It therefore follows that changes in the between-group values directly reflect the divergence in the real mean incomes of the two groups. The clear conclusion of the decomposition analysis was that variations within groups were far more important in accounting from total inequality than variations between groups. In two group case between groups component was contributing less than 3 percent to total inequality in 1998. When the population is grouped into eight socio-economic groups, according to the squared coefficient of variation disparities between groups account for 15.5 percent of total inequality in 1990, 12.1 percent in 1993 and 8 percent in 1998. As can be seen in Table 3 the within component of the variance of log income does not reflect quite the same pattern as the other measures. The reason may be that the variance of log income places more weight on low incomes.

The inequality in both groups continued to increase during the latter part of the 1990's. Interestingly the divergence in inequality between two groups remained almost the same until 1997. Since then the growth of inequality has been more rapid among those not in work than in group 1. An important part of the explanation for the overall increase in inequality must be sought in the divergence of experiences within different groups. There was divergences in the average income of different groups (see Figure 4) and the relative sixes of groups changed over the 1990s (see Table A3). So it is not just the increased numbers of unemployed and the increased gap between the incomes of group 1 and group 2 which is responsible for increased

Table 2
Income Inequality in Finland 1990, 1993 and 1998

Inequality measure	Group	Year 1990			Year 1993			Year 1998		
		FI	GI	DI	FI	GI	DI	FI	GI	DI
Generalised	1	14.0	9.3	6.2	17.1	10.1	6.9	19.2	12.3	9.1
entropy class		(0.29)	(0.20)	(0.13)	(0.45)	(0.30)	(0.24)	(0.67)	(0.51)	(0.46)
of measures	2	56.7	10.6	7.1	55.1	11.3	7.7	78.0	16.0	11.6
($c = 0$)		(2.24)	(0.43)	(0.31)	(2.66)	(0.58)	(0.47)	(6.37)	(1.50)	(1.25)
	Total	37.3	10.9	7.0	44.0	11.4	7.5	49.4	14.8	10.4
		(0.71)	(0.19)	(0.12)	(0.99)	(0.28)	(0.22)	(1.27)	(0.53)	(0.47)
($c = 1$)	1	13.5	9.8	6.4	16.8	10.8	7.5	19.9	14.1	10.7
		(0.32)	(0.27)	(0.15)	(0.70)	(0.55)	(0.45)	(1.16)	(0.97)	(0.92)
	2	45.3	11.4	7.5	45.7	12.4	8.3	92.0	21.5	15.6
		(2.14)	(0.54)	(0.37)	(3.38)	(0.94)	(0.77)	(17.0)	(9.95)	(3.24)
	Total	24.7	11.2	7.1	31.2	12.2	8.1	36.3	17.1	12.5
		(0.42)	(0.25)	(0.14)	(0.77)	(0.48)	(0.39)	(1.56)	(1.13)	(1.05)
($c = 2$)	1	16.1	12.1	7.2	22.9	15.3	10.4	30.9	22.6	17.5
		(0.72)	(0.62)	(0.24)	(3.46)	(2.49)	(1.77)	(4.30)	(3.34)	(3.16)
	2	72.7	14.3	8.9	83.4	17.4	11.2	666.2	66.6	45.6
		(8.09)	(0.96)	(0.64)	(15.5)	(2.53)	(1.89)	(292.0)	(28.9)	(21.0)
	Total	26.2	13.7	8.0	38.5	16.9	11.0	59.5	31.9	24.1
		(0.86)	(0.58)	(0.23)	(4.08)	(2.10)	(1.43)	(9.09)	(5.74)	(5.16)
Variance of	1	29.9	18.0	12.5	36.7	19.5	13.3	39.8	22.5	16.4
logarithms		(0.76)	(0.38)	(0.31)	(1.08)	(0.71)	(0.65)	(1.41)	(0.59)	(0.55)
	2	174.2	20.1	14.1	164.3	21.1	14.7	200.0	27.1	19.9
		(8.87)	(0.77)	(0.67)	(11.15)	(0.87)	(0.73)	(14.56)	(1.69)	(1.68)
	Total	125.5	21.4	14.0	138.6	22.2	14.6	158.8	27.4	18.8
		(3.91)	(0.38)	(0.28)	(4.66)	(0.59)	(0.43)	(6.39)	(0.72)	(0.50)
Atkinson	1	6.6	4.6	3.1	8.0	5.0	3.5	9.1	6.3	4.7
index		(0.62)	(0.63)	(0.63)	(0.81)	(0.83)	(0.84)	(0.90)	(0.92)	(0.93)
($e = 0.5$)	2	21.3	5.3	3.6	21.0	5.7	3.9	32.0	8.5	6.2
		(1.03)	(0.82)	(0.82)	(1.38)	(1.12)	(1.12)	(3.42)	(1.62)	(1.55)
	Total	13.4	5.3	3.4	16.3	5.7	3.8	18.1	7.5	5.4
		(0.56)	(0.54)	(0.54)	(0.66)	(0.67)	(0.67)	(0.79)	(0.78)	(0.79)
($e = 1.0$)	1	13.1	8.9	6.1	15.7	9.6	6.6	17.5	11.6	8.7
		(5.78)	(6.16)	(6.17)	(7.30)	(8.03)	(8.06)	(7.92)	(8.67)	(8.69)
	2	43.3	10.1	6.9	42.4	10.7	7.4	54.2	14.8	11.0
		(4.33)	(7.44)	(7.60)	(5.89)	(10.13)	(10.32)	(6.20)	(11.60)	(11.91)
	Total	31.1	10.3	6.7	35.6	10.8	7.2	39.0	13.8	9.9
		(3.92)	(5.09)	(5.15)	(4.39)	(6.29)	(6.38)	(4.74)	(6.89)	(7.02)
($e = 2.0$)	1	27.3	16.7	12.1	37.2	21.0	15.1	38.0	21.9	16.7
		(1.20)	(1.09)	(1.16)	(3.67)	(3.22)	(2.85)	(2.33)	(1.70)	(1.74)
	2	93.4	18.9	13.8	90.4	19.9	14.3	96.1	28.4	22.2
		(1.13)	(1.55)	(1.58)	(1.80)	(1.87)	(1.97)	(0.85)	(4.08)	(4.02)
	Total	92.8	19.7	13.5	90.4	22.1	15.5	95.6	26.7	19.6
		(1.16)	(0.89)	(0.96)	(1.64)	(2.08)	(1.95)	(0.87)	(1.92)	(1.85)
Gini	1	28.2	23.7	19.4	31.2	24.5	20.0	32.7	27.0	23.1
coefficient		(0.32)	(0.29)	(0.22)	(0.48)	(0.44)	(0.39)	(0.60)	(0.57)	(0.54)
	2	55.5	25.4	20.5	55.5	25.7	20.8	66.6	30.4	25.3
		(0.90)	(0.50)	(0.43)	(1.11)	(0.67)	(0.59)	(3.03)	(1.70)	(1.52)
	Total	39.0	25.6	20.4	44.8	26.1	20.9	47.2	29.5	24.5
		(0.35)	(0.26)	(0.20)	(0.45)	(0.36)	(0.32)	(0.63)	(0.57)	(0.55)

Household income is adjusted by OECD equivalence scale.
FI = Factor income, GI = Gross income, DI = Disposable income.
Asymptotic standard errors in the parentheses.

Table 3

Within components from total inequality of disposable income for the socio-economic status and working activity of the household head

Year	Socio-economic status				Working activity			
	Mean log deviation (c=0)	Theil index (c=1)	$CV^2/2$ (c=2)	Var of logs	Mean log deviation (c=0)	Theil index (c=1)	$CV^2/2$ (c=2)	Var of logs
1990	82.15	82.54	84.45	81.52	92.65	93.13	94.22	91.75
1991	82.82	83.16	85.16	81.93	94.60	94.86	95.66	93.76
1992	82.75	83.59	86.08	81.44	94.82	95.14	95.99	93.64
1993	81.79	83.40	87.86	81.19	94.94	95.43	96.73	94.23
1994	78.84	80.79	84.65	78.00	92.85	93.49	94.86	91.80
1995	81.15	83.43	88.22	81.00	93.96	94.67	96.25	92.99
1996	79.22	81.53	85.62	79.25	94.01	94.57	95.76	92.98
1997	79.50	82.37	88.95	79.41	93.63	94.55	96.67	92.65
1998	80.38	84.18	91.94	78.88	94.72	95.75	97.88	92.62

inequality, but also the gap between well-paid people in group 1 and poorly paid people in group 1; between richer pensioners and poorer pensioners in group 2. It is also apparent that the differences between the mean income of various subgroups within those not in work and those in work have diverged during the latter part of the 1990's. Therefore we also perform further decompositions in both groups. The purpose of this is to try to isolate where the growth in inequality is occurring. Figure 4 indicates that whilst the economy has grown significantly during recent years the fruits of that growth are not shared equally. There was a declining trend in the share of unemployed population (household head more than six moths unemployed) while other groups have, on average, enjoyed more and less significant real income gains over the last 4-5 years. In particular, the share of disposable income has grown significantly in the case of entrepreneurs during the latter part of the 1990's. It is also apparent in Figure 4 that the differences between the mean incomes of various groups have diverged. In particular the mean income of the white collars group in 1990 was around twice higher than that of the second poorest group (unemployed) whereas in 1993 the white collars group was less than twice richer than the unemployed but in 1998 the mean income of the richest group was more than twice higher than that of the unemployed.

The multifaceted nature of the inequality increase is well illustrated in Figure 5. Indexing at 100 in 1990 the Figure 5 shows how the Gini coefficient rose for the most

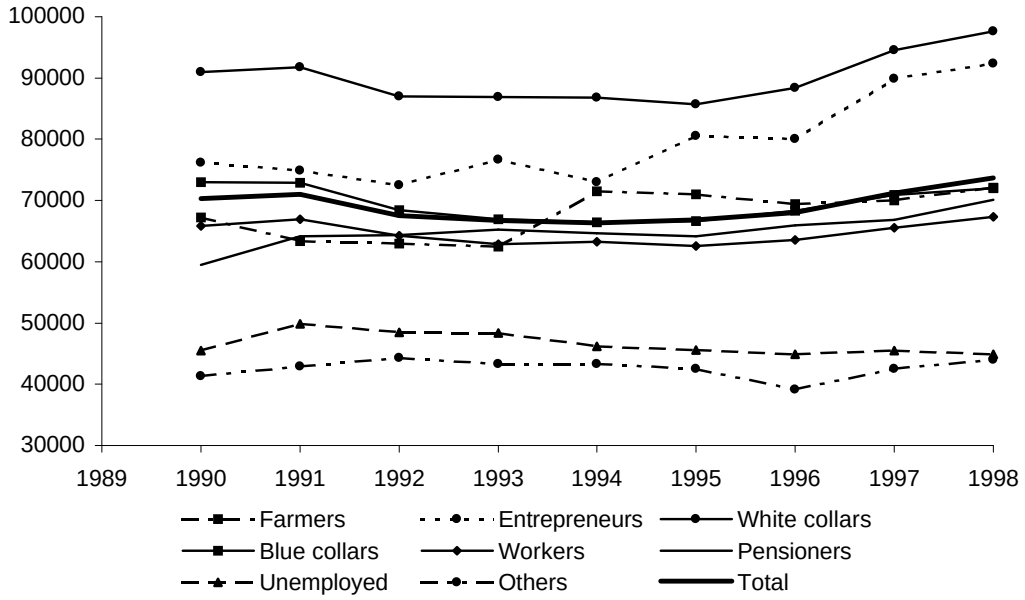


Figure 4 Real average disposable income by socio-economic groups

of the groups in the period 1990-1998. Over the first six years under examination (1990-1995), the contribution of the unemployed population to overall inequality on this measure (Gini) declined. It rose between 1996-1998. As we showed in the previous section the contribution of particular group to overall income inequality is, however, depended on the combination of two things – the extent of income inequality within the group and the size of the group. In fact in the earlier part of the period these two factors were working in opposite directions. Between 1994 and 1998 the most significant increases were among households headed by pensioners, farmers, entrepreneurs and white collars.

To gain further understanding of changes in income inequality between 1990 and 1998 we used a shift sharing analysis (Atkinson, 1992).[9] This method is based on

[9]Although the process Kuznets (1955) hypothesized has gone into sharp reverse in Finland and other advanced countries, it does not mean that the analytical framework used by Kuznets (1955) could not be still useful. "Changes in the distribution of income are outcome of several forces operating in different directions. As the balance of these forces varies, we may expect the resulting trend in inequality to change direction. ··· The balancing of conflicting forces is evident from what is perhaps the most important legacy of Kuznets' approach: the analytical framework for examining the contribution to overall inequality of different sectors of the economy." Atkinson (1992, p. 26).

Table 4

Shift-share analysis of population share, income shares and group inequalities

Condition	Mean log deviation ($c = 0$)		Variance of log income ($Lnvar$)	
	1990	1998	1990	1998
$x90$	**6.9**		**14.0**	
$x98$	9.2	10.4	14.4	18.8
$m90$	**6.9**		**14.0**	
$m98$	5.0	10.4	14.0	18.8
$I_1(\cdot)90$	**6.9**		**14.0**	
$I_1(\cdot)98$	9.6	10.4	17.1	18.8
$I_2(\cdot)90$	**6.9**		**14.0**	
$I_2(\cdot)98$	7.9	10.4	15.2	18.8

decomposition of inequality measures by household employment status. If we take, for example, Theil's measure (c=0) and replace the 1990 values for the share of those in work by that for 1998 ($x98$ in Table 4) then the calculated change is a rise of 2.3 percentage points. The actual total rise in income inequality (the bold numbers are actual values in Table 5) from 1990 to 1998 was 3.5 percentage points. If we in turn replace the 1990 values for inequality in group 1 and 2, one at a time, by their 1998 values $I_1(0)90$, $I_1(0)98$ for $c = 0$ and $I_2(Lnvar)90$ and $I_2(Lnvar)98$ for the variance of logarithmic income in Table 4, then the rise in inequality among group 2 "explains" for 71 percent of the difference in inequality between 1990 and 1998. The rise in inequality taken both groups together "explains" for 94 percent of the difference.

As one would expect, the unemployed and other categories are very much "over-represented" at the bottom of the distribution. Unemployment has a disequalising influence through its impact on household income from employment, increasing the mean difference between those in work and those not in work. More importantly there is an effect of arising from the increasing number of the poor households per capita. This latter impact of unemployment is more clear cut than its impact on income inequality.

There are several alternative approaches to measuring poverty. On this occasion, we restrict ourselves to looking at the numbers of households with below half average income during the 1990's. Figure 6 shows clearly that if the poverty line set at 50 per cent of national average income the numbers of unemployed households below the line have increased dramatically since the 1994. Figure 6 also shows that if the line (not any more poverty line) is twice the average disposable income the numbers

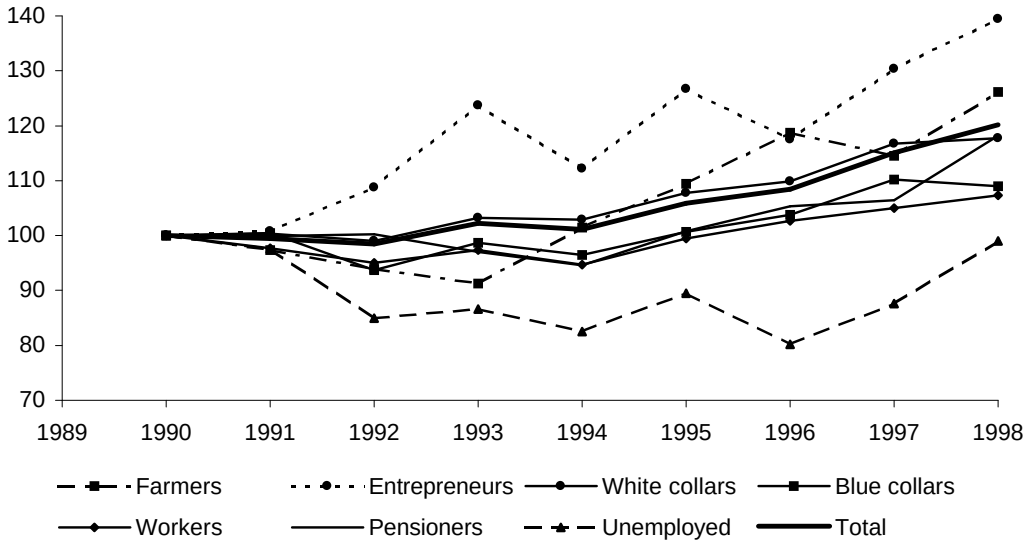


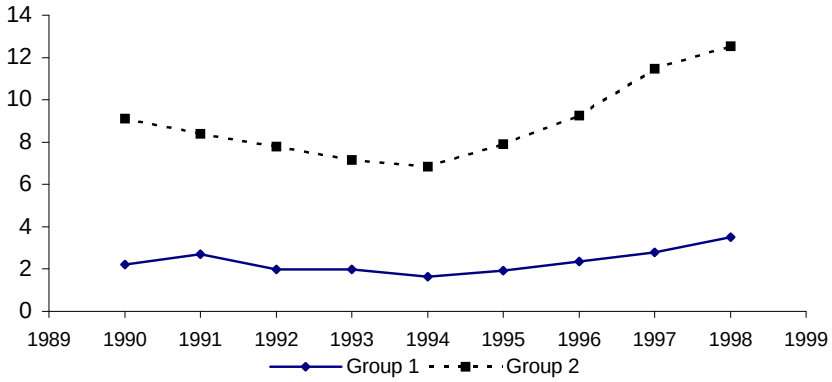
Figure 5 Gini coefficients for different socio-economic groups

of households in both groups above the line have increased over the 1990s.

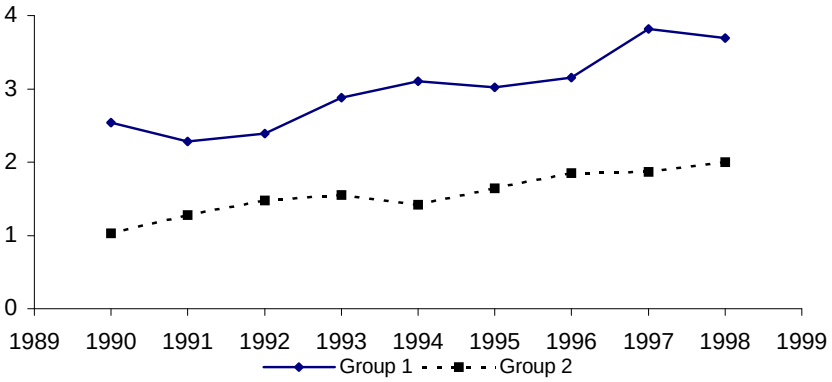
Redistributive impact of taxes and transfers

We are especially interested in household's net income, that is, their income after they have received social security benefits and paid taxes on their income. Understanding the impact of taxes and benefits is a crucial part in understanding over trends in inequality. The most obvious way to proceed is to examine the actual amounts of taxes paid and benefits received by households in the 1 and 2 groups in our data and then look at how those have changed over time. Of course this approach is not without problems. Namely this approach is not able to distinguish between changes in the tax structure and changes in the distribution of the pre-tax income. The alternative would have been to apply the 1990 tax and benefit system to the 1998 distribution of household income. The difficulty with this approach would be that it is not easy to trace all behavioural changes if the old tax and benefit system were to be reintroduced. Moreover it is not easy to reconstruct the old tax and benefit system. For these reasons we didn't adopt this approach. Using the actual amounts of taxes paid and benefits received by households we may ask whether the redistributive role of government has fallen or not during the 1990's. Is it so that the policy has contributed to the rise in inequality?

a) Cutting point one half from the average of disposable income for group 1 and 2



b) Cutting point twice the average of disposable income for groups 1 and 2



c) Cutting point one half from the average of disposable income for pensioner and unemployed

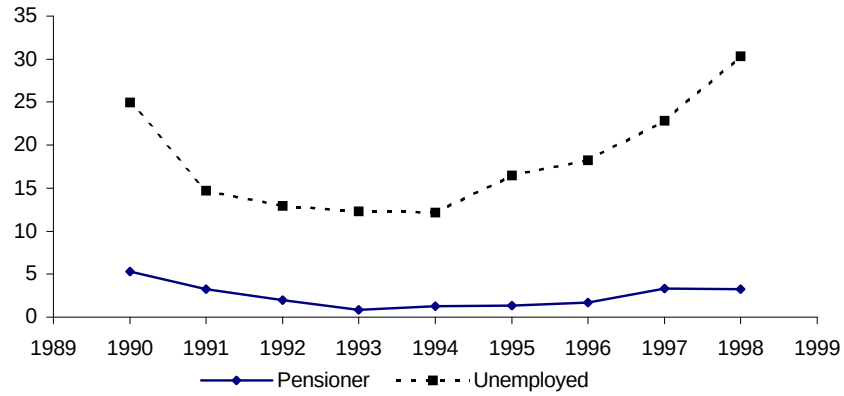


Figure 6 Percentages of population

In considering the impact of taxes and transfers, we can distinguish between the automatic responses of budget to changing gross incomes and policy changes in the tax and benefit system. There are a number of automatic mechanisms in taxes and benefits. For instance, the unemployment benefit system provides protection against loss of labour incomes, hence moderating the rise in inequality in gross incomes. This is just what happened in Finland in the beginning of the 1990s. Table 3 and Figure 1 in the introduction show how indicators of redistribution have varied over the 1990s. The Gini coefficient for factor income increased from 39 per cent in 1990 to 44.8 per cent in 1993, mainly due to rise in unemployment, and not then rising so rapidly. The rise in the Gini coefficient for gross income (including transfers) was less rapid up to the mid 1990s: the rise from 1990 to 1993 was 0.5 percentage point compared with a rise of 5.8 percentage points for factor income. After 1993 the situation reverses: the Gini coefficient for factor incomes rose by 2.4 percentage point from 1993 to 1998 but that for gross income increased by 3.4 percentage points. The rise for disposable income was even larger, 3.6 percentage points (see Table A4 in Appendix A: Gini coefficients for the different components of factor income). In Figure 7 the redistribution of income measured in terms of the difference between the Gini coefficients of factor income and disposable income are given from 1990 to 1998 for group 1 and the whole population. We see that the redistributive contribution of direct taxes and transfers fell during the latter part of the 1990s. All six measures support the same conclusion, except the squared coefficient of variation. This may reflect the well-known disadvantage of this measure that it is very sensitive to outliers (very high and very low incomes a long way from the mean). As regards two groups the picture for group 1 is also very much the same as for the whole population. For those not in work the picture is different. As we can see from Table 3 the Gini coefficient for factor income in the group 2 remained the same from 1990 to 1993 but the rise from 1993 to 1998 was 11.1 percentage points. Also the rise in the Gini coefficient for gross income from 1993 to 1998 was in this group more rapid than in the whole population.

5 Decomposition by income sources

So far we have looked at the income inequality treating income as a single lump. Of course people have incomes from different sources such as labour, capital and social security. These different income sources are distributed differently within the population. Next we examine some of major trends in the different sources of income.

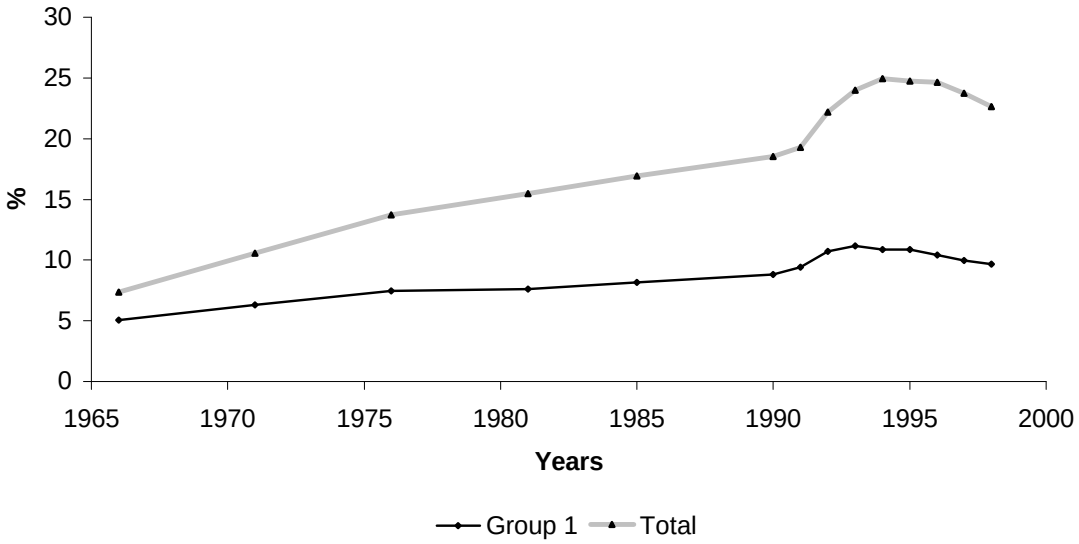


Figure 7 Redistribution of income; for group 1 and the whole population

We use a measure that is decomposable in order to assess how changes in different income sources have affected overall income inequality. We break down total income into following components; labour income, entrepreneurial income, capital income, pensions and other transfers. As we mentioned earlier the biggest source of income is earnings. The second biggest source of income throughout the period (see in Appendix A, Table A1) has been transfers or social security. Its share has risen sharply from 11.0 per cent in 1966 to 41.9 per cent in 1994 and then it has fallen to 35.7 in 1998. The share of capital income actually declined from the mid 1960's to the mid 1980's, but since then has gradually risen to form 15.1 per cent of household income in 1998.

To see how different this composition of income is at different parts of disposable income distribution we show in Figure 8 (and in Figure A2 in Appendix A) income composition by decile. Throughout the last decade, labour income have made up the most important source of total household income, but their role is less important for poorer deciles in 1998 than in 1990. Figure 8 shows that the shares of labour income below median have declined during the 1990's. For the poorest decile, labour income plays a rather minor role, making up about 40 per cent of the income of the poorest decile in 1990 and just over 30 per cent in 1998. Labour income provides

over a half of income from the second decile, reaching a maximum in the ninth decile. It falls back in the richest decile. This fall right back at the top reflects large receipts of capital income and entrepreneurial incomes in the top decile. The high level of capital income also reflects the very considerable concentration of wealth and therefore income from wealth. The tenth decile has 33 per cent of its income deriving from capital, other deciles 14 per cent and less. Transfers provide the major part of the income of the poorest deciles. They play important role for some households even in the fifth and sixth deciles.

One way to looking at changes in the contribution of different income sources is to consider the proportion of each income component going to group 1 and group 2. Such figures are given in Table 5. They show among other things that the share of capital income in group 1 has grown during the 1990's. In fact we shall see that the reason for this is that capital income has risen significantly among entrepreneurs and white collars. The inequality in question is that of disposable household income. This is the household income after taxes and social security contributions. Disposable income could be expressed as the sum of incomes of all sources of gross income minus taxes and social security contributions. Therefore, taxes and social security contributions are treated here as a negative income.

Table 5

The shares of incomes by two groups 1990, 1993 and 1998

Income source	Year 1990			Year 1993			Year 1998		
	1	2	Total	1	2	Total	1	2	Total
Earnings	97.7	2.3	100	95.3	4.7	100	96.5	3.5	100
Capital income	64.5	35.5	100	63.2	36.8	100	68.0	32.0	100
Transfers received	42.9	57.1	100	37.0	63.0	100	35.5	64.5	100
Transfers paid	91.2	8.8	100	81.6	18.4	100	84.5	15.5	100
Disposable income	82.8	17.2	100	72.4	27.6	100	74.8	25.2	100

Another way of thinking about the same issue is to look at changes in the contribution of different income components to the squared coefficient of variation. By contrast to the decomposition analysis by population subgroups there are relatively few measures that will allow a convenient breakdown by component of income. Following the methodology of Shorrocks (1982) we use the squared coefficient of variation. This measure can be readily broken down into its constituent parts. This measure is well-defined even in the presence of negative income components. We

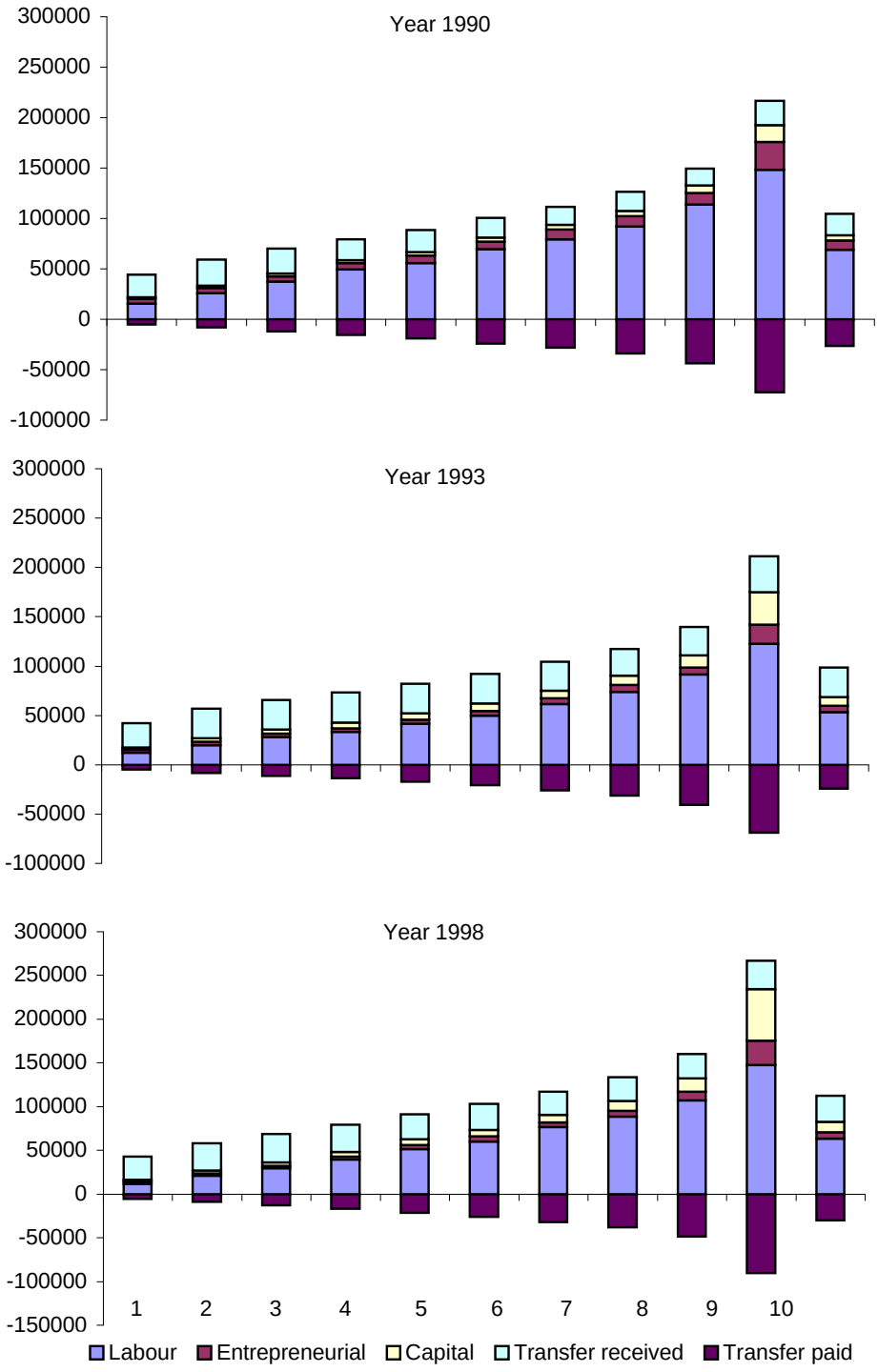


Figure 8 Income composition by deciles

define the total inequality, I, as the sum of the contributions of each source of income

$$I = \sum_k S_k \tag{6}$$

where S_k is the absolute contribution of the source k to total inequality. Now define

$$s_k = S_k / I \tag{7}$$

so $\sum s_k = I$. s_k is the proportional contribution of the source k to total inequality. When the squared coefficient of variation is used, the absolute contribution of a given income source is

$$S_k = cov(y_k, y)/m^2 \tag{8}$$

where m is the mean income and y is the total households income and $cov(.)$ is the covariance between the household incomes from k and total income. The proportional contribution of each sources to total inequality can be written as

$$s_k = cov(y_k, y)/\sigma^2 = \rho_k \sigma_k / \sigma \tag{9}$$

where ρ_k is the correlation coefficient of between y_k and y, σ_k is the standard deviation from the incomes from source k and σ is the standard deviation for total income. Note that $cov(y_k, y) = \rho_k \sigma_k \sigma$.

The squared coefficient of variation the contributions of each income source can be written as follows

$$S_k = (C_k^a + C_k^b)/2 \tag{10}$$

where $C_k^a = \sigma_k^2/m^2$ and $C_k^b = \sigma_k^2 + 2cov(y_k, y - y_k)/m^2$.

The contribution C of source k might be regarded as (a) the inequality which would be observed if income component k was the only source of income differences; (b) the amount by which inequality would fall if factor i income receipts were eliminated (Shorrocks 1982, p. 209).

The importance of each income source in contributing to overall inequality is shown by Figure 9 and Tables 6-12. The role of each income source in contributing to total income inequality is determined by three factors, the correlation between the income from the source k and the total disposable household income, the share of income from source k in total disposable income and within source inequality.

Figure 9 shows how the evolving level of total income inequality since 1990 has been generated by different disequalising contributions from these different sources of total household income. This figure has two especially striking features. First overall inequality has increased substantially, as we already have seen in the previous

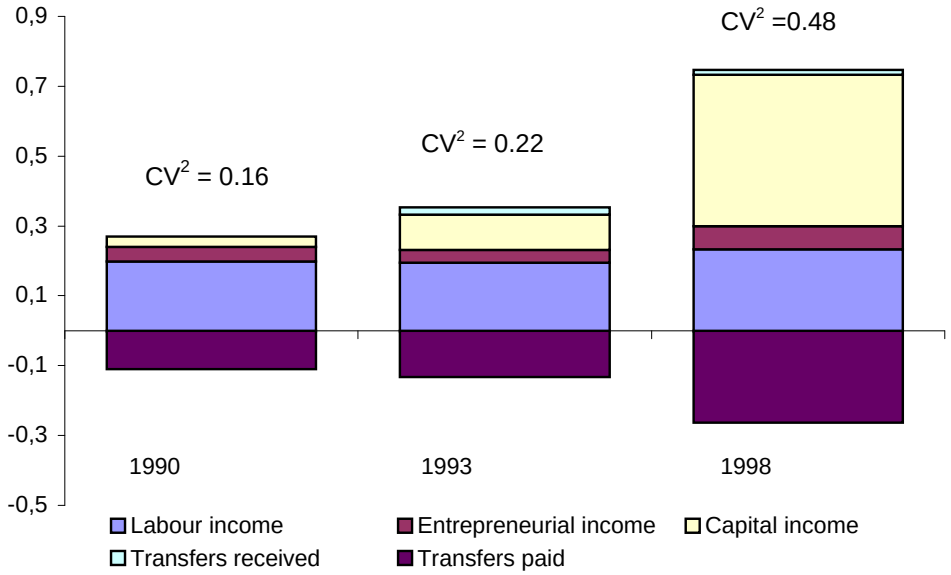


Figure 9 Decomposition of disposable income

section. The sources of income inequality are now more diverse than previously, in 1990, the great majority of income inequality reflected inequality of earnings, but by the late 1990's the combined effects of other income (mainly capital income) sources has grown to be more important. Figure A3 in Appendix A shows the proportional contributions of different income sources to total income.

Table 6 gives decomposition of inequality by income source. Table 7 in turn provides detailed decomposition of different group inequality (CV^2 index) by income source.

Earnings and inequality:

The contribution of earnings inequality to total inequality has declined over the 1990's. Earnings are still the biggest single source of income. They made the biggest contribution to total income inequality still in 1997, but not anymore in 1998. Measured within source inequality for earnings has actually fallen over the period and it is in fact relatively low compared with within-source inequality for the other income sources. There are two reasons why earnings are still the important contributor to total income inequality. The biggest component of disposable income

Table 6

Decomposition of inequality of disposable income by income sources and taxes in year 1990, 1993 and 1998

Year		Earned income	Capital income	Transfers received	Transfers paid
1990	CV^2	0.5843	8.8558	1.5836	0.9430
	m_k/m	0.9972	0.0658	0.2713	-0.3343
	s_k	1.4952	0.1907	0.0053	-0.6911
	S_k	0.2390	0.0305	0.0008	-0.1105
	$\rho_{y_k,y}$	0.7843	0.3890	0.0062	-0.8511
1993	CV^2	0.8717	6.9346	1.0007	1.0339
	m_k/m	0.8017	0.1227	0.4013	-0.3257
	s_k	1.0483	0.4641	0.0881	-0.6005
	S_k	0.2308	0.1022	0.0194	-0.1322
	$\rho_{y_k,y}$	0.6572	0.6741	0.1029	-0.8508
1998	CV^2	0.8934	24.9773	1.1448	1.3493
	m_k/m	0.8577	0.1507	0.3570	-0.3655
	s_k	0.6182	0.9010	0.0274	-0.5466
	S_k	0.2984	0.4348	0.0132	-0.2638
	$\rho_{y_k,y}$	0.5298	0.8309	0.0498	-0.8944

is earnings (85.8 per cent in 1998, see Appendix A, Table A1) and earnings have the high correlation with total disposable income. As it can be seen in Table 8 in 1998 62 per cent and in 1993 105 per cent of the total income inequality is attributed to earnings. Table 9 shows decomposition according to labour income. The picture is very much the same as it was in the case of earnings. This is simply so because the major part of earnings comes from labour income.

Capital income and inequality:

Capital income has always been highly concentrated and so changes that increase the importance of capital income in household incomes contribute a disequalizing influence. Capital income is a source of income whose contribution to overall income inequality has risen dramatically over the 1990's. This is because the number of households receiving large amounts of capital income from property, share income and other more large scale investments has risen. A notable example is the increased personal ownership of equities, especially during the latter part of the 1990's. During the 1990's there has been the substantial shift of wealth into the stock market. The share of capital income in total income has risen from 6.6 per cent in 1990 to 15.1 per

Table 7

Decomposition of different group inequality by income sources
in year 1990, 1993 and 1998

		$100*s$				m_k/m				$\rho_{y_k,y}$			
	CV^2	EI	CI	TR	TP	EI	CI	TR	TP	EI	CI	TR	TP
Year 1990													
CV2		0.584	8.856	1.584	0.943								
Farmers	0.184	126	18	2	-46	97.6	12.3	19.1	-29.0	0.89	0.43	0.06	-0.74
Entrepn.	0.311	138	41	5	-85	121.4	10.1	13.2	-44.8	0.89	0.50	0.17	-0.87
Wcollars	0.123	165	17	1	-83	132.5	5.1	9.7	-47.2	0.91	0.42	0.03	-0.89
Bcollars	0.094	125	16	10	-51	114.9	4.4	14.1	-33.3	0.81	0.42	0.16	-0.82
Workers	0.081	147	10	-6	-52	111.5	2.9	16.6	-30.9	0.87	0.32	-0.09	-0.83
Pension.	0.159	31	28	90	-49	10.0	14.2	93.4	-17.5	0.48	0.58	0.79	-0.82
Unempl.	0.118	36	13	73	-22	38.8	6.8	70.2	-15.9	0.43	0.38	0.70	-0.67
Others	0.320	34	45	32	-11	45.3	8.7	56.8	-10.7	0.48	0.68	0.45	-0.49
Total	0.159	150	19	1	-69	99.7	6.6	27.1	-33.4	0.78	0.39	0.01	-0.85
Year 1993													
CV2		0.872	6.935	1.001	1.034								
Farmers	0.156	99	24	15	-38	79.2	18.5	24.9	-22.6	0.82	0.55	0.30	-0.78
Entrepn.	0.784	82	72	1	-55	94.7	23.8	17.1	-35.5	0.78	0.81	0.03	-0.88
Wcollars	0.145	140	31	5	-76	122.5	10.5	15.0	-48.0	0.85	0.59	0.11	-0.88
Bcollars	0.086	138	21	-1	-58	104.6	7.9	21.5	-33.9	0.82	0.51	-0.01	-0.85
Workers	0.081	135	23	-6	-51	100.2	7.3	24.9	-32.3	0.79	0.48	-0.09	-0.81
Pension.	0.202	16	61	76	-53	8.3	19.3	96.3	-23.8	0.33	0.80	0.74	-0.82
Unempl.	0.115	60	31	46	-37	27.9	8.9	81.9	-18.7	0.55	0.53	0.52	-0.75
Others	0.335	9	61	51	-21	23.2	10.8	78.6	-12.6	0.17	0.79	0.68	-0.72
Total	0.220	105	46	9	-60	80.2	12.3	40.1	-32.6	0.66	0.67	0.10	-0.85
Year 1998													
CV2		0.893	24.97	1.145	1.349								
Farmers	0.371	102	23	1	-26	87.6	17.8	19.7	-25.2	0.91	0.48	0.05	-0.72
Entrepn.	1.092	49	103	0	-53	89.3	38.1	13.6	-41.0	0.60	0.90	0.01	-0.93
Wcollars	0.281	95	71	-1	-66	126.4	13.4	11.9	-51.7	0.73	0.78	-0.02	-0.88
Bcollars	0.104	132	21	3	-56	108.9	9.0	19.8	-37.6	0.82	0.55	0.05	-0.86
Workers	0.095	150	15	-10	-55	108.9	7.1	20.7	-36.7	0.88	0.49	-0.17	-0.87
Pension.	0.810	8	116	21	-44	8.5	21.4	94.4	-24.3	0.26	0.93	0.43	-0.93
Unempl.	0.162	38	52	43	-32	20.4	8.9	87.9	-17.1	0.45	0.70	0.52	-0.84
Others	2.388	3	154	6	-63	29.3	14.6	71.1	-15.0	0.14	0.97	0.30	-0.97
Total	0.482	62	90	3	-55	85.8	15.1	35.7	-36.6	0.53	0.83	0.05	-0.89

EI = Earned income, CI = Capital income, TR = Transfers received, TP = transfers paid

cent in 1998. For those not in work (group 2) the share has risen from 13.6 per cent in 1990 to 19.2 per cent in 1998. The reason can be found from the corresponding figures for pensioners; 14 per cent in 1990 and 21 per cent in 1998, see Table 7. This has meant that capital income has become increasingly positively correlated with total disposable household income; it is high income households in which the receipt of large amounts of capital is concentrated. Hence, as it can be seen in Tables 7 and 10 the impact of capital income as contributor to overall inequality has been

Table 8
Earnings inequality

	Year 1990	Year 1993	Year 1998
$100^* s_k$	149.4	104.8	61.8
CV_k^2	0.585	0.872	0.894
m_k/m	0.997	0.802	0.859
ρ_k	0.784	0.657	0.530

Table 9
Labour income and inequality

	Year 1990			Year 1993			Year 1998		
	1	2	Total	1	2	Total	1	2	Total
$100^* s_k$	122.9	12.5	123.4	97.2	9.7	88.5	65.3	2.6	48.3
CV_k^2	0.389	5.359	0.706	0.493	4.354	1.021	0.472	6.339	1.000
m_k/m	1.040	0.095	0.877	0.946	0.119	0.718	1.002	0.086	0.771
ρ_k	0.721	0.242	0.670	0.666	0.184	0.573	0.561	0.114	0.435

increased. In 1990 only 19 per cent of the income inequality of the total net income is attributed to incomes from this source while in 1998 that figure is 90 per cent. The dominant contributor to overall inequality in Finland during 1990-1997 was earnings. In 1998 capital income was the number one.

The contribution of the group, entrepreneurs, to income inequality rose markedly during the 1990's, see Table 7. This is simply because capital income has become a more important income source for this group. The factor share of capital income for this group has risen from 10.1 per cent in 1990 to 38.1 per cent in 1998. At the same time capital income of entrepreneurs has steadily become more positively correlated with total income over the period. Moreover capital income also became more unequally distributed amongst this group. These three factors together explain the declining equalizing effect of capital income for this group. The 1993 tax reform, a so-called dual income tax system, is undoubtedly one of the key factors responsible for this trend. This view is supported by the fact that the share of entrepreneurial income indicates a declining trend over the period. The dual income tax system requires a splitting of the income of the self-employed and the income of active owners of firms into a labour income component and a capital income component. Since the two components cannot be observed directly, this splitting gives rise to a number of practical problems. On the other hand the dual income tax system

creates new rooms for tax avoidance through the transformation of labour income subject to high marginal rates into capital income subject to low marginal rates. In fact critics of the dual income tax system warned of this kind of distributional consequences.

Table 10

Capital income and inequality

	Year 1990			Year 1993			Year 1998		
	1	2	Total	1	2	Total	1	2	Total
$100*s_k$	20.1	29.4	19.0	45.9	56.2	46.4	74.4	117.8	90.1
CV_k^2	13.88	2.352	8.85	8.671	4.337	6.937	16.89	40.28	24.98
m_k/m	0.051	0.136	0.066	0.107	0.163	0.123	0.137	0.192	0.151
ρ_k	0.401	0.597	0.389	0.663	0.782	0.674	0.782	0.924	0.831

Social security and taxes and inequality:

The main source of income for those not in work is in fact social security. Therefore it is important to know the redistributive impact of transfers during the 1990's. Table 11 shows the proportional contribution of social security income to the squared coefficient of variation first rose and then came down. It is hardly surprising as Table 11 shows that the majority if social security income is paid to those not in work.

Table 11

Social security

	Year 1990			Year 1993			Year 1998		
	1	2	Total	1	2	Total	1	2	Total
$100*s_k$	1.2	89.3	0.5	0.5	77.0	8.8	-1.1	22.6	2.8
CV^2	1.498	0.295	1.584	0.918	0.284	1.001	1.002	0.279	1.145
m_k/m	0.141	0.903	0.271	0.205	0.917	0.401	0.169	0.915	0.357
ρ_k	0.026	0.772	0.006	0.011	0.747	0.103	-0.039	0.446	0.050

The proportional contribution of income taxes and social security contributions had to overall inequality were -69 per cent in 1990 and -55 per cent in 1998 (see Table 12). Hence the contribution of taxes and social security contributions to overall income inequality declined slightly during the 1990's in Finland.

Table 12

Income taxes and social security contributions.

	Year 1990			Year 1993			Year 1998		
	1	2	Total	1	2	Total	1	2	Total
$100^* s_k$	-71.2	-43.8	-68.9	-62.2	-47.2	-60.0	-57.8	-47.0	-54.7
CV_k^2	0.742	1.941	0.945	0.8	1.642	1.034	0.869	4.559	1.35
m_k/m	-0.369	-0.171	-0.335	-0.367	-0.218	-0.326	-0.415	-0.225	-0.366
ρ_k	-0.853	-0.779	-0.847	-0.864	-0.803	-0.851	-0.889	-0.933	-0.894

Kernel density estimates:

There is an alternative, complementary, approach to analyse redistributive impact of transfers and taxes and changes in the shape of the income distribution. We use graphical methods, the kernel estimation method. In Figure 10 are shown the distributions for the two groups, horizontal scale being equivalent disposable income divided by mean. Clearly the distributions for those two groups are quite different. Amongst those not in work households, there is a distinct concentration of incomes around one income level - corresponding to basic retirement pension and benefit levels. Very few people have incomes below this level, but there is a significant spread above it. This reflects the incomes for pensioners with private incomes (capital incomes) and those still working. By contrast, the density function for those in work households has the hump shape. How has the shape of the distribution changed during the 1990's? Interestingly, the modal incomes for group 2 are almost the same in 1990, 1993 and 1998, but there was the distinct fall in the height of the peak of the density mountain and shift in the central mass downwards, away from those with other sources of income, such as private pensions and especially capital income among pensioners. For those in work households the modal income remained much the same but the height of the peak of the density mountain did not change. Figure A4 in Appendix A provides histograms and kernel density estimates by eight socio-economic groups.

Figure 10 can also be used to comment on changes in the extent of poverty. Namely, the area between zero and the poverty line is the proportion of the poor in the population (the so called head count ratio determined to be equal half the mean of OECD-adjusted income).

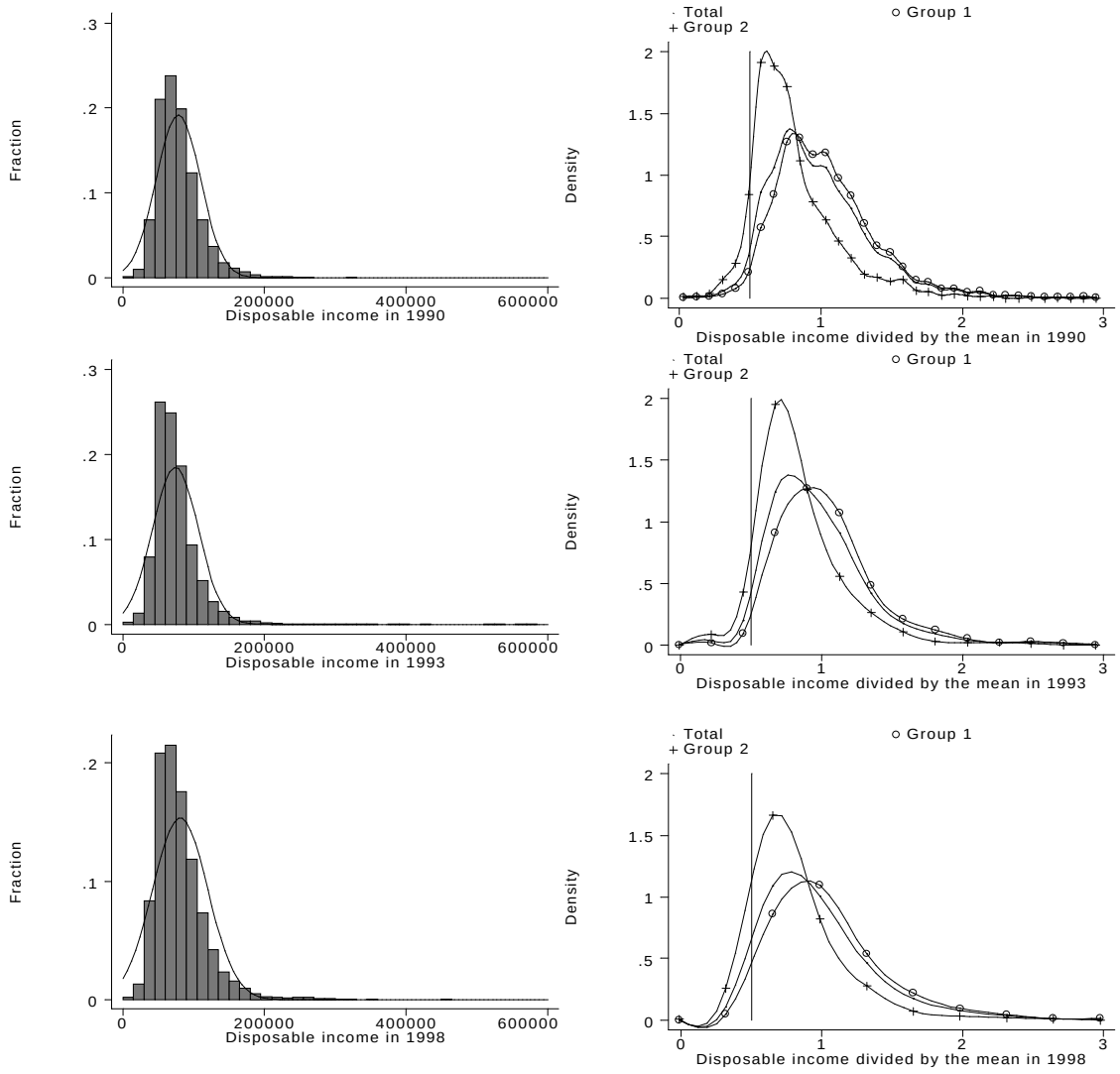


Figure 10 Histograms of disposable income distribution and Epanechnikov kernel functions for those in work and those not in work groups in 1990, 1993 and 1998

6 Conclusions

In this study income inequality in Finland was investigated using a decomposition analysis by income group and income source. We have offered some explanations for the recent trends or episode in income inequality, focusing on changes in employment status and the role of different sources of incomes. Several conclusions can be drawn from its results. Total inequality rose significantly during the latter part of the 1990's. In most cases inequality rose both within and between population

subgroups. The clear conclusion of decomposition is that variations within groups were far more important in accounting for total inequality than variations between groups. As a general pattern inequality rose proportionately more within those socio-economic groups with growing capital income shares. In particular among entrepreneurs this share grew most significantly during the 1990's. The results show that capital income although it appears to represent only 15 percent of the total equivalent household income makes by far the most significant contribution to overall inequality. The 1993 tax reform, a so-called dual income tax system, is undoubtedly one of key factors responsible for this trend. Rising unemployment in the early 1990's, perhaps surprisingly, did not just increase income inequality. More importantly, the numbers of the unemployed below the poverty line (50 per cent of national average income) have risen from 1994. Since 1991 there was a declining trend in the average real disposable income of unemployed households. The paper also shows that the redistributive impact of taxes and transfers has declined during the 1990's.

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Appendix A

Table A1

The share (in percentages) of income from different sources in total disposable household income 1990-1998 (OECD-units)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Earned income	99.7	93.0	89.1	80.2	81.5	84.6	85.1	84.7	85.8
Labour income	87.7	82.6	79.0	71.8	71.8	74.7	76.5	75.7	77.1
Entrepreneurial income	12.0	10.4	10.1	8.4	9.7	9.9	8.6	9.0	8.7
Capital income	6.6	8.3	8.8	12.3	12.1	11.3	12.3	13.8	15.1
Factor income	106.3	101.4	97.9	92.4	93.7	95.9	97.4	98.5	100.8
Transfer received	27.1	30.0	36.6	40.1	41.9	41.4	40.3	37.7	35.7
National pensions	5.0	4.6	4.9	5.1	5.0	5.0	4.9	4.4	4.1
Earnings-related pensions	12.0	12.6	14.1	15.0	15.7	16.5	16.8	16.1	15.6
Unemployment benefits	1.3	2.8	5.8	8.0	8.1	7.3	6.9	6.1	5.0
Other transfers received	8.8	10.0	11.9	12.1	13.1	12.6	11.7	11.1	11.0
Gross income	133.5	131.4	134.5	132.6	135.5	137.2	137.7	136.2	136.5
Transfers paid	-33.5	-31.4	-34.5	-32.6	-35.5	-37.3	-37.8	-36.2	-36.5
Direct taxes	-32.4	-30.3	-33.4	-30.0	-31.9	-32.5	-32.6	-30.9	-31.3
Other transfers paid	-1.1	-1.1	-1.1	-2.6	-3.7	-4.7	-5.2	-5.3	-5.3
Disposable income	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table A2

The share (in percentages) of income from different sources in total gross household income 1990-1998 (OECD-units)

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Earned income	74.7	70.8	66.2	60.5	60.2	61.6	61.8	62.2	62.8
Labour income	65.7	62.8	58.7	54.2	53.0	54.4	55.5	55.6	56.5
Entrepreneurial income	9.0	8.0	7.5	6.3	7.2	7.2	6.3	6.6	6.3
Capital income	4.9	6.4	6.5	9.3	9.0	8.2	8.9	10.1	11.0
Factor income	79.7	77.1	72.8	69.7	69.1	69.8	70.7	72.3	73.9
Transfer received	20.3	22.9	27.2	30.3	30.9	30.2	29.3	27.7	26.1
National pensions	3.7	3.5	3.7	3.8	3.7	3.7	3.6	3.2	3.0
Earnings-related pensions	9.0	9.6	10.5	11.3	11.6	12.0	12.2	11.9	11.4
Unemployment benefits	1.0	2.1	4.3	6.1	6.0	5.3	5.0	4.4	3.7
Other transfers received	6.6	7.6	8.8	9.1	9.7	9.2	8.5	8.2	8.1
Gross income	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Transfers paid	-25.1	-23.9	-25.7	-24.6	-26.2	-27.1	-27.4	-26.6	-26.8
Direct taxes	-24.3	-23.0	-24.9	-22.6	-23.5	-23.7	-23.7	-22.7	-22.9
Other transfers paid	-0.8	-0.9	-0.8	-1.9	-2.7	-3.5	-3.8	-3.9	-3.9
Disposable income	74.9	76.1	74.3	75.4	73.8	72.9	72.6	73.4	73.2

We have divided the population into two groups: those households where household head is in work and those households where household head is not in work. From Table A3 we can find that the non-working has increased its share from 21.1 in 1990 to 29.8 in 1998. The reason for this is the rise of the unemployed households as we can see in the lower part of the Table A3. We also perform further splitting by socio-economic status in both groups.

Table A3

Population shares of different groups

Population group	1990	1991	1992	1993	1994	1995	1996	1997	1998
Working activity									
Group 1	78.9	77.0	72.4	68.5	67.0	68.5	68.7	69.4	70.2
Group 2	21.1	23.0	27.6	31.5	33.0	31.5	31.3	30.6	29.8
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Socio-economic status									
Farmers	5.7	5.5	4.9	4.8	4.9	4.6	4.5	4.1	3.7
Entrepreneurs	7.4	7.4	6.8	6.6	6.3	6.4	6.3	7.0	7.3
White collars	16.2	16.1	15.4	15.0	15.1	15.3	15.8	15.5	16.6
Blue collars	19.5	20.3	20.1	19.9	18.5	18.8	19.1	19.1	18.3
Workers	30.1	27.8	25.1	22.3	22.2	23.3	23.1	23.7	24.3
Pensioners	18.4	17.9	18.7	19.8	20.2	20.6	20.9	21.0	20.7
Unemployed	0.6	2.3	5.0	8.0	8.7	7.5	6.8	5.9	5.4
Others	2.1	2.9	3.9	3.7	4.1	3.4	3.5	3.8	3.7
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table A4

Gini coefficients of factor income and its components, gross income and disposable income 1990-1998

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998
Earned income	41.0	42.3	45.6	48.9	49.5	49.2	49.4	49.4	49.1
Labour income	45.7	46.7	49.7	53.1	54.2	53.4	53.4	53.3	52.6
Entrepreneurial income	87.9	89.3	89.9	91.7	91.1	91.4	92.5	92.1	93.3
Capital income	96.2	87.2	86.1	70.8	67.5	74.3	71.0	71.3	72.6
Factor income	39.0	39.6	42.3	44.9	45.6	46.4	46.8	47.3	47.2
Transfer received	59.6	56.8	53.2	50.5	48.5	50.0	51.2	52.6	53.3
Gross income	25.6	25.2	25.4	26.1	25.8	26.9	27.5	28.6	29.5
Transfers paid	44.1	43.8	43.9	45.5	44.0	44.3	44.5	45.4	45.9
Disposable income	20.4	20.3	20.1	20.9	20.7	21.6	22.2	23.5	24.5

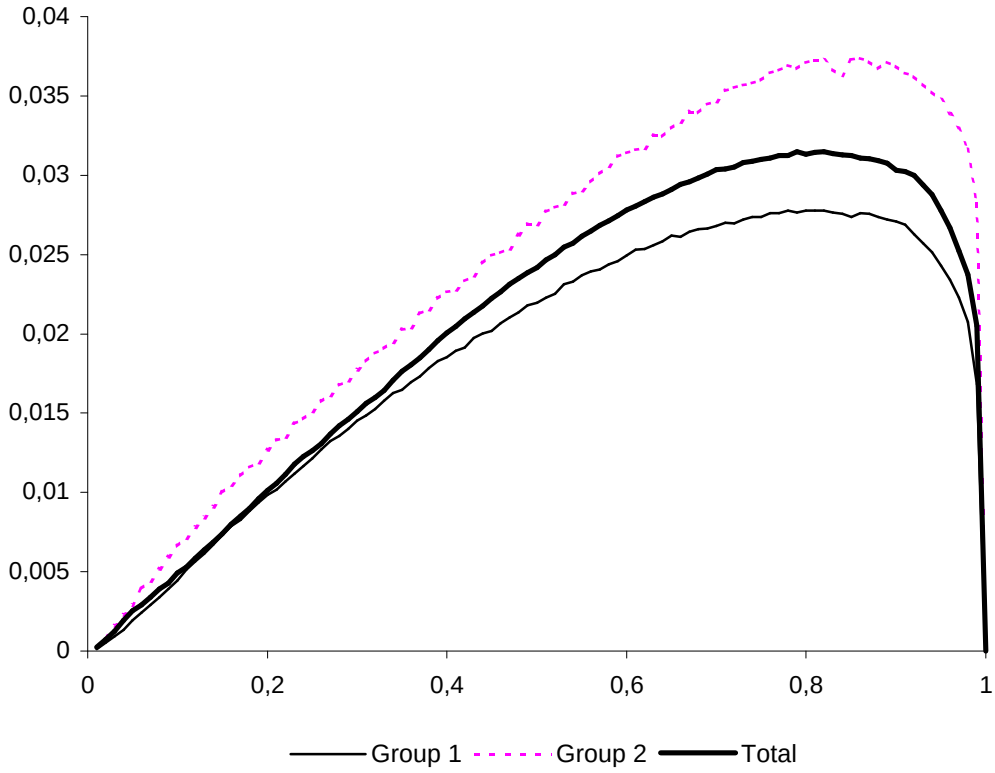

Figure A1:
Lorenz curve differences between year 1990 and 1998

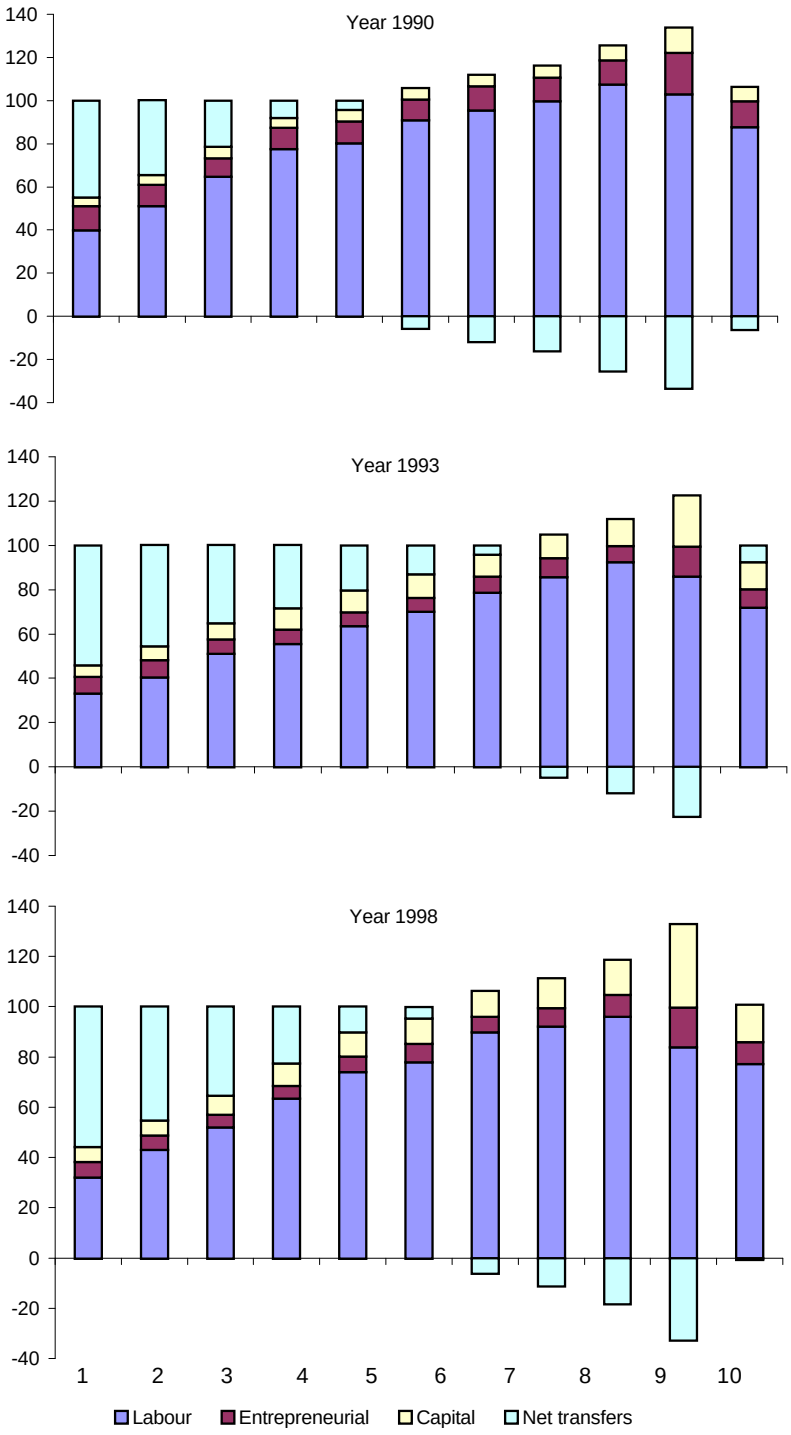

Figure A2:
Income composition by decile

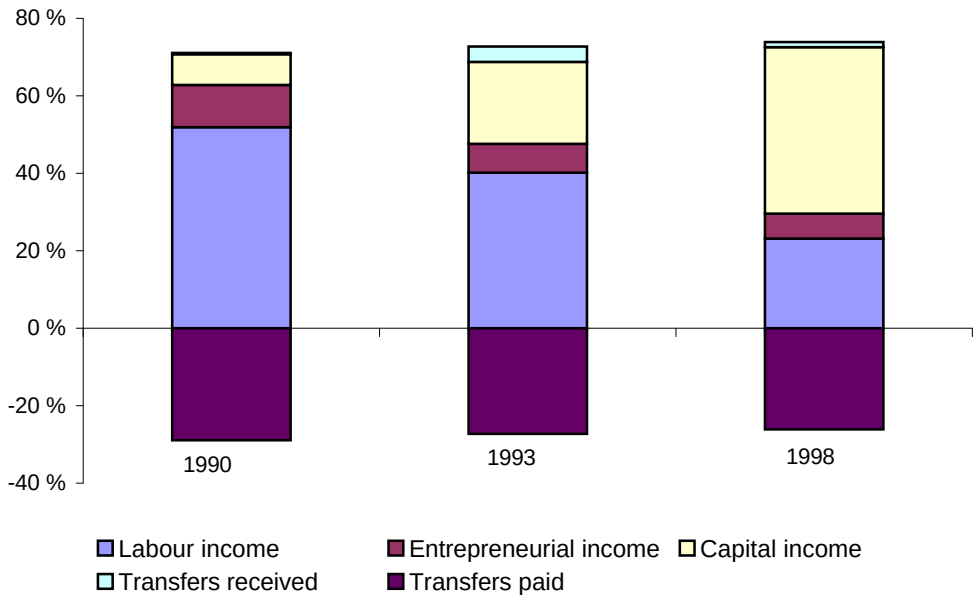

Figure A3:
Proportional decomposition of disposable income

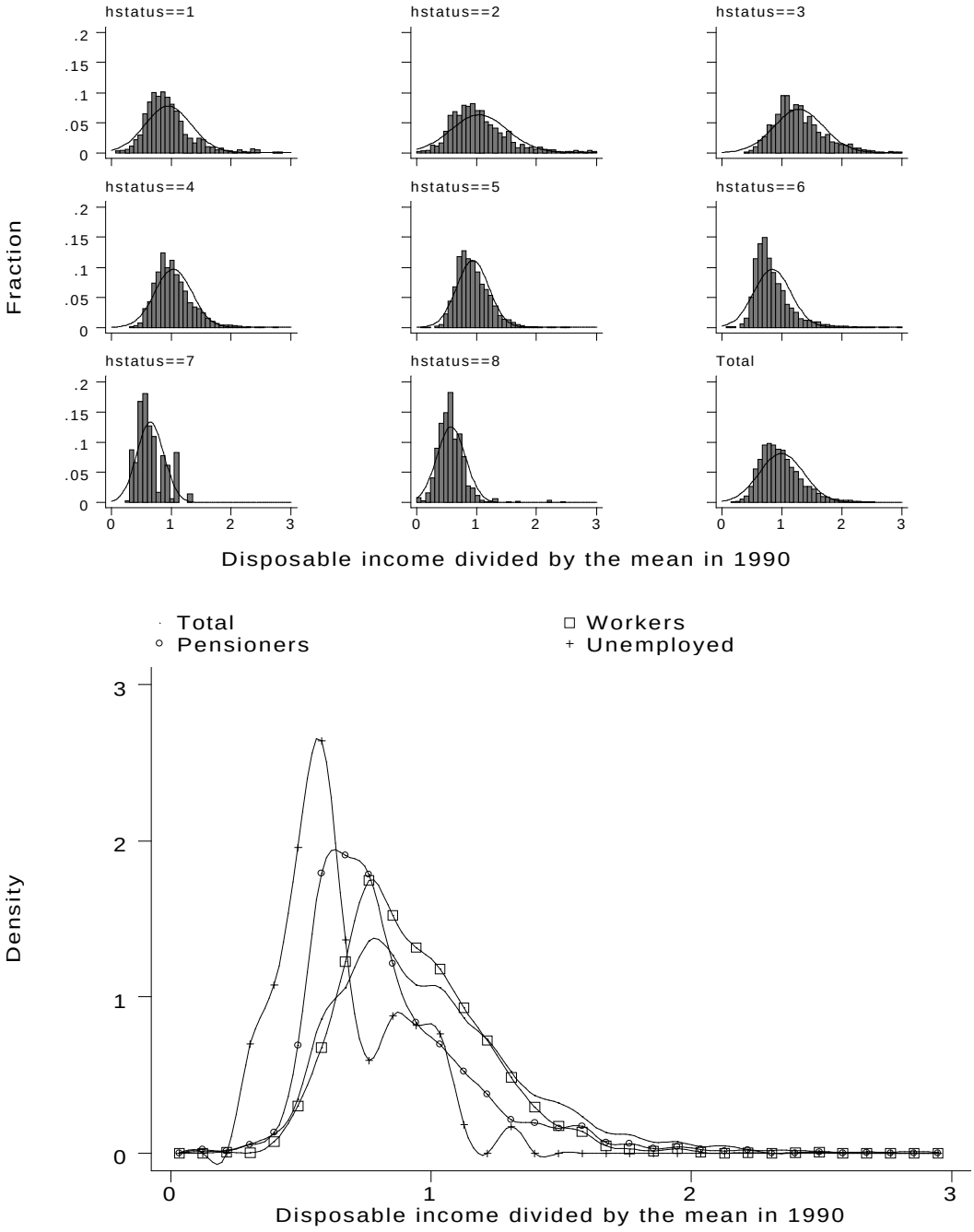

Figure A4:
Histograms and kernels by socio-economic status in 1990

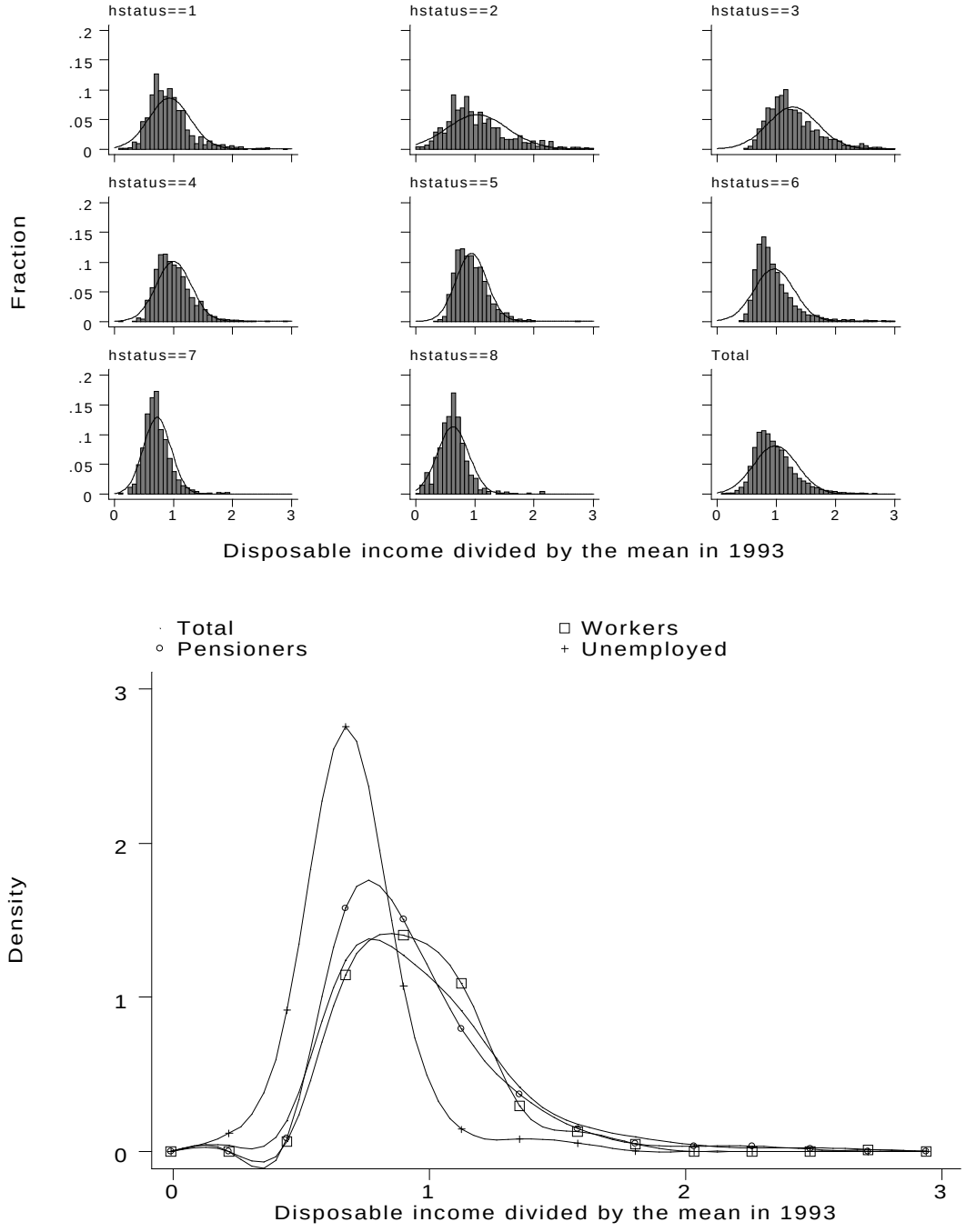

Figure A5:
Histograms and kernels by socio-economic status in 1993

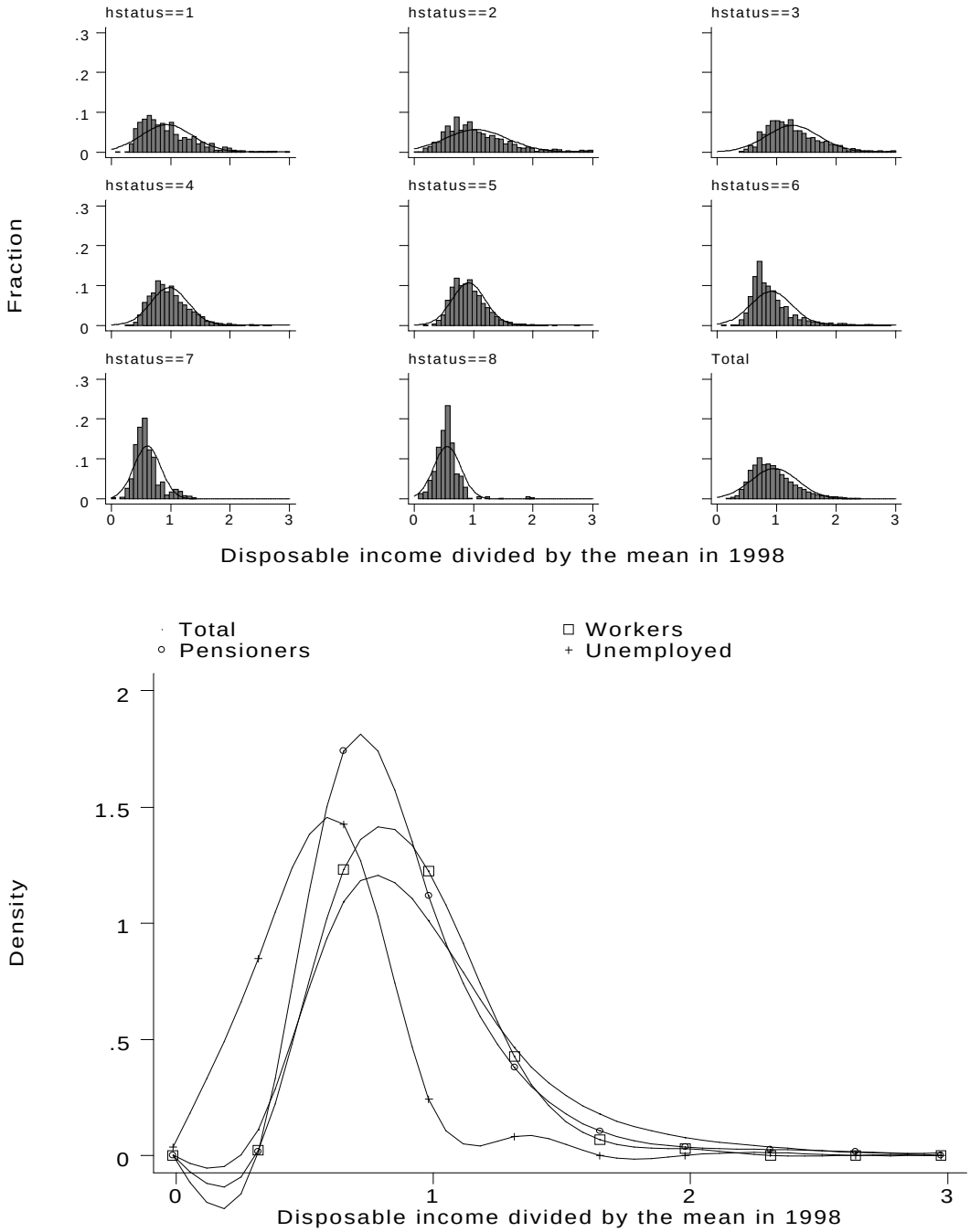

Figure A6:
Histograms and kernels by socio-economic status in 1998

Appendix B Inequality measures used in the study

We define y_i as income variable for individual $i = 1, 2, \cdots, n$, m is the arithmetic mean, $\tilde{m}$ the geometric mean and $f_i = w_i / \sum_i w_i$, the weighting variable, c the aversion parametric of the generalised entropy measure and e the aversion parametric of the Atkinson index.

Members of generalised entropy class of measures have the general formula as follows:

$$I(c) = \frac{1}{c^2 - c} \left[\sum_{i=1}^{n} f_i (\frac{y_i}{m})^c - 1 \right], \quad c \neq 0, 1 \tag{11}$$

Mean log deviation ($c = 0$):

$$I(0) = \sum_{i=1}^{n} f_i \, ln(m/y_i). \tag{12}$$

The Theil index ($c = 1$):

$$I(1) = \sum_{i=1}^{n} f_i \, (y_i/m) \, ln(y_i/m). \tag{13}$$

The half the squared coefficient of variation ($c = 2$):

$$I(2) = \frac{1}{2} \left[\sum_{i=1}^{n} f_i \, (\frac{y_i}{m})^2 - 1 \right] = \frac{1}{2} \sum_{i=1}^{n} f_i (y_i - m)^2 / m^2 = CV^2/2. \tag{14}$$

Variance of log income:

$$I(Lnvar) = \sum_{i=1}^{n} f_i (lny_i - \tilde{m})^2. \tag{15}$$

The Atkinson index:

$$A(e) = 1 - \left[\left(\sum_{i=1}^{n} f_i (lny_i)^{1-e} \right)^{\frac{1}{1-e}} / m \right]. \tag{16}$$

Gini coefficient:

$$G = \sum_{j=1}^{n} \sum_{i=1}^{j} f_i f_j \mid y_i - y_j \mid / m. \tag{17}$$